CSU researchers continue to predict active 2023 Atlantic hurricane season

Note to reporters: The full report is available at [*tropical.colostate.edu*](tropical.colostate.edu).

Colorado State University hurricane researchers continue to call for an above-normal Atlantic hurricane season, despite the development of a robust El Niño. Sea surface temperatures averaged across the tropical and subtropical Atlantic are at record warm levels. Normally El Niño reduces Atlantic hurricane activity, while an extremely warm Atlantic increases hurricane activity, so how these diametrically opposing factors interact will determine exactly how much activity occurs in 2023.

The tropical Pacific currently has weak El Niño conditions, that is, water temperatures are somewhat above normal across the eastern and central tropical Pacific. This El Niño is likely to continue to intensify as the Atlantic hurricane season progresses. However, there is still uncertainty as to how strong El Niño will be. El Niño tends to increase upper-level westerly winds across the Caribbean into the tropical Atlantic. The stronger upper-level winds result in increased vertical wind shear, which is the difference in direction and strength of winds from the lower to the upper levels of the atmosphere. Strong wind shear is detrimental for hurricane formation and intensification, as it tends to tear storms apart.

Waters across the tropical and subtropical Atlantic continue to be near or at record levels across most of the basin. Warmer-than-normal waters in the tropical Atlantic provide more fuel for hurricanes. The extreme warmth that is currently observed across most of the North Atlantic is the primary reason for the above-average seasonal hurricane forecast, despite the El Niño.

Given the conflicting signals between a likely moderate/strong El Niño and a much warmer-than-normal tropical and subtropical Atlantic, the team stresses that there is more uncertainty than normal with this outlook.

18 named storms

The CSU Tropical Meteorology Project team is predicting 18 named storms in 2023, including the five named storms that have already formed (January subtropical storm, Arlene, Bret, Cindy and Don). Of those, researchers expect nine (including Don) to become hurricanes and four to reach major hurricane strength (Saffir/Simpson category 3-4-5) with sustained winds of 111 miles per hour or greater.

The team bases its forecasts on two statistical models, as well as four models that use a combination of statistical information and forecasts from dynamical models from the UK Met Office, the European Centre for Medium-Range Weather Forecasts, the Japan Meteorological Agency, and the Centro Euro-Mediterraneo sui Cambiamenti Climatici. These models use 25–40 years of historical hurricane seasons and evaluate conditions including: Atlantic sea surface temperatures, sea level pressures, vertical wind shear levels, El Niño, and other factors.

So far, the 2023 hurricane season is exhibiting characteristics similar to 1951, 1969, 1987, 2004, 2005, 2006 and 2012. "Our analog seasons exhibited a wide range of outcomes, from below-normal seasons to hyperactive seasons," said Phil Klotzbach, research scientist in the Department of Atmospheric Science and lead author of the report. "This highlights the large uncertainty that exists with this outlook." Forecasters also note that there are no great analogs for this season, where a moderate/strong El Niño and an extremely warm Atlantic co-exist.

The team predicts that 2023 hurricane activity will be about 130% of the average season. By comparison, 2022's hurricane activity was about 75% of the average season. The 2022 hurricane season will be most remembered for its two major hurricanes: Fiona and Ian. Fiona brought devastating flooding to Puerto Rico before causing significant surge, wind and rain impacts in the Atlantic Provinces of Canada as a post-tropical cyclone. Ian made landfall as a Category 4 hurricane in southwest Florida, causing over 150 fatalities and $113 billion dollars in damage.

In addition to the various hurricane metrics that CSU has forecast for many years, the forecast team is introducing a new metric this year. This metric is Accumulated Cyclone Energy (ACE) occurring west of 60°W. ACE is an integrated metric accounting for storm frequency, intensity and duration. ACE generated west of 60°W correlates better with landfalling storms in the Atlantic basin than basinwide ACE. Generally, a slightly lower percentage of basinwide ACE occurs west of 60°W in El Niño years. El Niño is extremely likely in 2023, and consequently the percentage of basinwide ACE occurring west of 60°W is predicted to be slightly lower than average this year.

The CSU team will issue a verification of all 2023 seasonal Atlantic hurricane forecasts in late November.

This is the 40th year that the CSU hurricane research team has issued an Atlantic basin seasonal hurricane forecast. The Tropical Meteorology Project team also includes Michael Bell, professor in the CSU Department of Atmospheric Science and Alex DesRosiers, a PhD candidate in the same department. Bill Gray, who originated the seasonal forecasts, launched the report in 1984 and continued to author them until his death in 2016.

The CSU forecast is intended to provide a best estimate of activity in the Atlantic during the upcoming season – not an exact measure.

As always, the researchers caution coastal residents to take proper precautions.

"It takes only one storm near you to make this an active season for you," Bell said.

Landfalling probability included in report

The report also includes the probability of major hurricanes making landfall for the remainder of the season:

- 48 percent for the entire U.S. coastline (full season average from 1880-2020 is 43 percent)

- 25 percent for the U.S. East Coast including the Florida peninsula (full season average from 1880-2020 is 21 percent)

- 31 percent for the Gulf Coast from the Florida panhandle westward to Brownsville (full season average from 1880-2020 is 27 percent)

- 53 percent for tracking through the Caribbean (full season average from 1880-2020 is 47 percent)

The forecast team also provides probabilities of named storms, hurricanes and major hurricanes tracking within 50 miles of each county or parish along the Gulf and US East Coast, as well as hurricane-prone coastal states, Mexican states, Canadian provinces and countries in Central America and the Caribbean. These probabilities for regions and countries are adjusted based on the current seasonal forecast.

Atlantic Basin hurricane forecast for 2023

Released August 3, 2023
Tropical Cyclone Parameters Extended Range
(1991–2020 Climatological Average Forecast for 2023
in parentheses)
Named Storms (14.4)* 18**
Named Storm Days (69.4) 90
Hurricanes (7.2) 9
Hurricane Days (27.0) 35
Major Hurricanes (3.2) 4
Major Hurricane Days (7.4) 9
Accumulated Cyclone Energy (123) 160
Accumulated Cyclone Energy West of 60°W (73) 82
Net Tropical Cyclone Activity (135%) 170
* Numbers in ( ) represent averages based on 1991–2020 data.
** Forecast numbers include the unnamed subtropical storm that formed in January as well as Arlene, Bret, Cindy and Don.